WHAT IS CLAIMED IS:

1. A hyperbranched polymer comprising at least one anhydrosugar-related compound selected from a dianhydrosugar alcohol represented by the following general formula [1]:

(wherein R is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms, provided that nR's are equal to or different from one another and at least one R of nR's is hydrogen atom, and

symbol n is an integer from 1 to 10) and an anhydrosugar alcohol represented by the following general formula [2]:

$$\begin{array}{c|c}
OR_{2} & O & OR_{3} \\
 & | & | & | \\
R_{1} - (CH)_{m} - CH - CH - (CH)_{p} - R_{4}
\end{array}$$
(2)

(wherein R_1 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_2 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_3 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R_4 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; provided that R_1 , mR_2 's, pR_3 's and R_4 are equal to or different from one another and at least one R_2 or R_3 of said mR_2 's and pR_3 's is hydrogen atom, respectively; and

symbol m is zero (0) or an integer from 1 to 20 and symbol p is an integer from 1 to 20, provided that symbol m+p is an integer from 1 to 20).

2. A hyperbranched polymer comprising at least one anhydrosugar-related compound selected from a dianhydrosugar alcohol represented by the following general formula [1]:

(wherein R is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms, provided that nR's are equal to or different from one another and at least one R of nR's is hydrogen atom, and

symbol n is an integer from 1 to 10) and an anhydrosugar alcohol represented by the following general formula [2]:

$$\begin{array}{c|cccc}
OR_{2} & OR_{3} \\
& & & \\
R_{1} - (CH)_{m} - CH - CH - (CH)_{p} - R_{4}
\end{array}$$
(2)

(wherein R_1 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_2 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_3 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R_4 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; provided that R_1 , mR_2 's, pR_3 's and R_4 are equal to or different from one another and at least one R_2 or R_3 of said mR_2 's and pR_3 's is hydrogen atom, respectively; and

symbol m is zero (0) or an integer from 1 to 20 and symbol p is an integer from integer from 1 to 20, provided that symbol m+p is an integer from 1 to 20)

with at least one sugar compound selected from an anhydrosugar as represented by the following general formula [3]:

$$R^{5}O \longrightarrow R^{6}O \longrightarrow R^{7}$$
(3)

by the following general formula [4]:

$$\begin{array}{c}
OR^6 \\
OR^5
\end{array}$$
(4)

by the following general formula [5]:

$$R^5O$$
 OR^7
 OR^6
 OR^6

by the following general formula [6]:

$$\mathbb{R}^{5} \mathbb{O} = \mathbb{Q}^{0} \mathbb{R}^{7}$$

$$\mathbb{Q}^{6} \mathbb{Q}^{6}$$

$$\mathbb{Q}^{6} \mathbb{Q}^{6}$$

and by the following general formula [7]:

(wherein R⁵ is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R⁶ is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R⁷ is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; provided that R⁵, R⁶ and R⁷ are equal to or different from one another).

- 3. The hyperbranched polymer as claimed in claim 1 or 2, wherein said hydrocarbon group is an alkyl group having from 1 to 30 carbon atoms, an aryl group having from 6 to 30 carbon atoms or an arylalkyl group having from 7 to 30 carbon atoms.
- 4. The hyperbranched polymer as claimed in claim 1 or 2, wherein said hydrocarbon group is an alkyl group having from 1 to 4 carbon atoms, an aryl group having from 6 to 12 carbon atoms or an arylalkyl group having from 7 to 10 carbon atoms.
- 5. The hyperbranched polymer as claimed in claim 1 or 2, wherein said dianhydrosugar alcohol [1] is a 1,2:5,6-dianhydro-D-mannitol-type compound, a 1,2:5,6-dianhydro-L-iditol-type compound, a 1,2:5,6-dianhydro-galactitol-type

compound, a 1,2:5,6-dianhydro-glucitol-type compound or a 1,2:5,6-dianhydro-xylitol-type compound.

- 6. The hyperbranched polymer as claimed in claim 1 or 2, wherein said anhydrosugar alcohol [2] is a 1,2-anhydro-D-mannitol-type compound, a 1,2-anhydro-L-iditol-type compound, a 1,2-anhydro-galactitol-type compound, a 1,2-anhydro-glucitol-type compound, a 1,2-anhydro-xylitol-type compound or a 1,2-anhydro-threitol-type compound.
- 7. The hyperbranched polymer as claimed in claim 1 or 2, wherein a degree of branching is from 0.05 to 1.00.
- 8. The hyperbranched polymer as claimed in claim 1 or 2, wherein a degree of branching is from 0.45 to 1.00.
- 9. A process for the preparation of a hyperbranched polymer comprising polymerizing at least one anhydrosugar-related compound selected from a dianhydrosugar alcohol represented by the following general formula [1]:

$$\begin{array}{c|c}
O & OR & O \\
CH_2 - CH - (CH)_n - CH - CH_2
\end{array}$$
(1)

(wherein R is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms, provided that nR's are equal to or different from one another and at least one R of nR's is hydrogen atom, and

symbol n is an integer from 1 to 10) and an anhydrosugar alcohol represented by the following general formula [2]:

$$\begin{array}{c|c}
OR_{2} & O & OR_{3} \\
I & I & I \\
R_{1} - (CH)_{m} - CH - CH - (CH)_{p} - R_{4}
\end{array}$$
(2)

(wherein R_1 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_2 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_3 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R_4 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; provided that R_1 , mR_2 's, pR_3 's and R_4 are equal to or different from one another and at least one R_2 or R_3 of said mR_2 's and pR_3 's is hydrogen atom, respectively; and

symbol m is zero (0) or an integer from 1 to 20 and symbol p is an integer from 1 to 20, provided that symbol m+p is an integer from 1 to 20) in the presence of a cationic initiator or an anionic initiator.

10. A process for the preparation of a hyperbranched polymer, comprising polymerizing at least one anhydrosugar-related compound selected from a dianhydrosugar alcohol represented by the following general formula [1]:

$$\begin{array}{c|c}
O & OR & O \\
CH_2-CH-(CH)_n-CH-CH_2
\end{array}$$
(1)

(wherein R is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms, provided that nR's are equal to or different from one another and at least one R of nR's is hydrogen atom, and

symbol n is an integer from 1 to 10)

and an anhydrosugar alcohol represented by the following general formula [2]:

$$\begin{array}{c|c}
OR_{2} & O & OR_{3} \\
 & | & | & | \\
R_{1} - (CH)_{m} - CH - CH - (CH)_{p} - R_{4}
\end{array}$$
(2)

(wherein R_1 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_2 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; R_3 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R_4 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; provided that R_1 , mR_2 's, pR_3 's and R_4 are equal to or different from one another and at least one R_2 or R_3 of said mR_2 's and pR_3 's is hydrogen atom, respectively; and

symbol m is zero (0) or an integer from 1 to 20 and symbol p is an integer from 1 to 20, provided that symbol m+p is an integer from 1 to 20)

with at least one sugar compound selected from an anhydrosugars as represented by the following general formula [3]:

$$R^{5}O \longrightarrow R^{6}O \longrightarrow R^{7}$$
(3)

by the following general formula [4]:

$$\begin{array}{c}
OR^{6} \\
OR^{5}
\end{array}$$
(4)

by the following general formula [5]:

$$R^{5}O$$
 OR^{7}
 OR^{6}
 OR^{6}

by the following general formula [6]:

$$\mathbb{R}^{5} \bigcirc \begin{array}{c} \bigcirc \mathbb{Q}^{7} \\ \bigcirc \mathbb{Q} \\ \bigcirc \mathbb{Q}^{6} \end{array}$$
 (6)

and by the following general formula [7]:

(wherein R5 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms;

 R^6 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; and R^7 is hydrogen atom or a hydrocarbon group having from 1 to 30 carbon atoms; however, provided that R^5 , R^6 and R^7 are equal to or different from one another) in the presence of a cationic initiator or an anionic initiator.

- 11. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said hydrocarbon group is an alkyl group having from 1 to 4 carbon atoms, an aryl group having from 6 to 12 carbon atoms or an arylalkyl group having from 7 to 10 carbon atoms.
- 12. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said dianhydrosugar alcohol [1] is a 1,2:5,6-dianhydro-D-mannitol-type compound, a 1,2:5,6-dianhydro-alitol-type compound, a 1,2:5,6-dianhydro-galactitol-type compound, a 1,2:5,6-dianhydro-galactitol-type compound, a 1,2:5,6-dianhydro-glucitol-type compound.
- 13. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said anhydrosugar alcohol [2] is a 1,2-anhydro-D-mannitol-type compound, a 1,2-anhydro-galactitol-type compound, a 1,2-anhydro-galactitol-type compound, a 1,2-anhydro-glucitol-type compound, a 1,2-anhydro-xylitol-type compound or a 1,2-anhydro-threitol-type compound.
- 14. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said cationic initiator is a thermal cationic initiator, a photo cationic initiator, a Lewis acid or a Brenstead's acid.
- 15. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said cationic initiator is sulphonium antimonate, boron trifluoride diethyl etherate, tin tetrachloride, antimony pentachloride, phosphorus pentachloride or trifluoromethane sulfonic acid.
- 16. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said anionic initiator is a hydroxide or a metal alcolate.
- 17. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said anionic initiator is KOH, tert-BuOK or Zn(OCH₃)₂.
- 18. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein said cationic initiator or said anionic initiator is used at the rate of 1 to 10% by weight of starting anhydrosugar-related compound.
- 19. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein a degree of branching is from 0.05 to 1.00.
- 20. The method for the preparation of the hyperbranched polymer as claimed in claim 9 or 10, wherein a degree of branching is from 0.45 to 1.00.